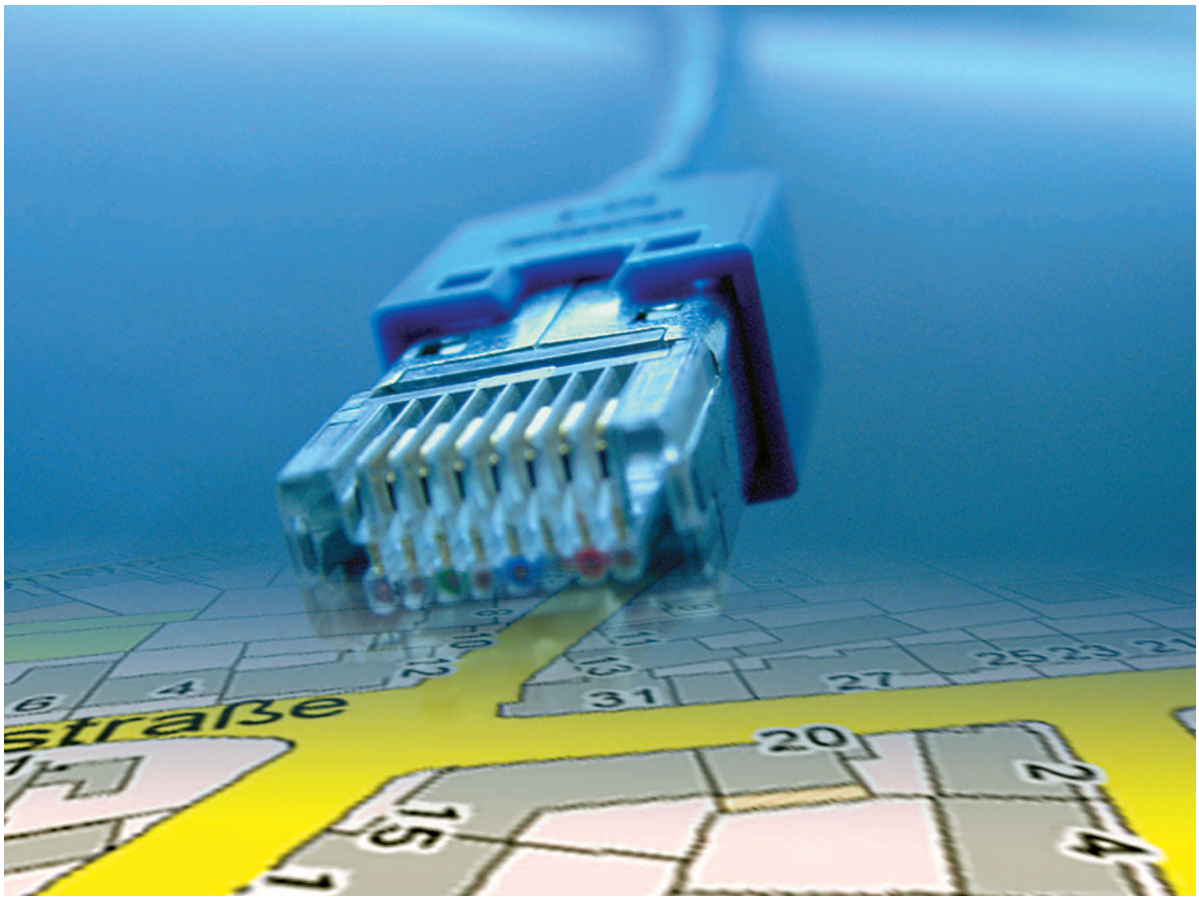
Working Committee of the

Surveying Authorities of the

States of the Federal Republic of Germany (AdV)



Progress Report

2004

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Official surveying and mapping with its data bases continues to move mainstream as an essential part of the modern enabling and granting state. Public and politics recognize that the official surveying and mapping develops towards a key resource for state and society.

For the tasks concerned the surveying authorities of the states of the Federal Republic of Germany are responsible. Nevertheless the indicated lines of action have to be technically and logically coordinated beyond the state boundaries by incorporating the respective authorities of the federal government and harmonised in terms of their basic structures throughout Germany. The requirements placed by a modern information society on the unified and standard-based modelling of the individual primary databases and harmonisation of the nationally significant technical infrastructures and tenders in official surveying and mapping emphasise the necessity of such coordination.

AdV as Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany feels itself obliged to this task of coordination, particularly surveying and mapping in Germany has to appear in all important facets as a unit not only within the Federal Republic, but also toward the European instances. It is from this focus that AdV, notwithstanding its lack of control competence, is considered a representative of official surveying and mapping in Germany.

These are all aspects of a fundamental coordination, integration and innovation task of the AdV as the community of surveying authorities of the states of the Federal Republic of Germany. It has attained even greater significance since the public and the politicians recognised the fact that official surveying and mapping is developing into a key resource for both state and society.

In line with the way AdV sees itself, it is involved with numerous action lines in the field of geoinformation. Examples of support for a host of ongoing activities are the documents published this year in Version 3.0 on the unified and future-facing modelling of data and methods of official surveying and mapping (GeoInfoDok) and the further operationalisation of the nationally available navigation and positioning service SAPOS®. Both projects have generated major interest, both nationally and internationally. They both also represent the technical know-how and innovative creative power of the surveying authorities integrated within the AdV.

The AdV also regards a further key task as being to enhance the function of the surveying authorities as providers of reference data through user-oriented distribution and business models and other marketing strategies. Strategic partnerships between the surveying authorities or such with private GIS firms are current cues. In this respect too, the AdV has during the reporting period adopted a pro-active approach, in order to enhance economic use and acceptance of the data and products offered by official surveying and mapping.

Finally, since the start of 2004 AdV worked in close collaboration with the corresponding technical levels in the federal government and in the states to create operative steering and coordination bodies with the geodata infrastructure for Germany (GDI-DE). These activities will assume even higher significance in the spectrum of tasks of the AdV in the medium term.

Further details can be found in the chapters of the following progress report, which the AdV has presented for 2004.

Reinhard Klöppel	Wilhelm Zeddies
President of AdV	Secretary General

1 Organisation and performance of tasks

In Germany, the federal states (Länder) assume responsibility for the performance of taskes in official surveying and mapping. The states supported by the "Bundesamt für Kartographie und Geodäsie (BKG)" (Federal Agency for Cartography and Geodesy) as well as by licensed surveyors and other administrative bodies at state or municipal level fulfilling the relevant staff requirements. Since 1948, the specialist state authorities and the Federal Ministries of the Interior, Defence and also for Transport, Building and Housing have jointly formed together in the Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany (AdV) in order to handle technical issues of fundamental and national importance. The German Geodetic Commission (DGK), representing the universities, education and scientific surveying and the Bund/Länder Working Committee for Rural Development (ArgeLandentwicklung), responsible for land consolidation and rural development in Germany, belong to AdV with guest status.

Surveying and cadastral authorities of the states

The majority of the survey and cadastre administrations of the states is assigned to the Ministries of the Interior of the states and shows a three-stage organisational structure. Whereas the state survey offices are responsible for supply of medium scale geospatial data-sets, the local cadastre offices have to perform the tasks of the real estate cadastre and to provide large scale geospatial basic information. The range of services of the survey and cadastre administrations includes:

- The constantly operating satellite positioning service of German state survey - SAPOS®
- The geodetic control networks and their proof in the Authoritative Control point Information System AFIS®
- The Authoritative Topographic-Cartographic Information System ATKIS®
- The task of furnishing proof on ca. 62 millions of land parcels within the official real estate cadastre (e.g. Automated Real Estate Map – ALK, Automated Real Estate Register – ALB and in the future Authoritative Real Estate Cadastre Information System ALKIS®)
- The topographical map series, aerial photography and thematic mapping.

The state survey offices are responsible for establishment and maintenance of the topographic map series.

Federal Agency for Cartography and Geodesy

Bundesamt für Kartographie und Geodäsie

As a federal authority in the sector of the Federal Ministry of the Interior, the Federal Agency for Cartography and Geodesy (BKG) fulfils tasks in the field of geo-information and geodesy in order to safeguard the responsibility of the government in this area. This applies specifically with the integration of surveying and geoinformation systems within a continental and global framework.

On behalf of the states, the BKG produces the topographic maps at scales smaller than 1:100 000. It also supports the use of high-accuracy satellite-based processes within the state survey authorities.

Geoinformation service of the Federal Armed Forces (Bundeswehr)

The task of the Agency for Geoinformation Science of the Bundeswehr (AGeoBw) is to merge all geosciences significant to the Federal Armed Forces (geodesy, geography, geology, remote sensing, cartography, geoinformation, meteorology, climatology, ecology, biology), so that under the slogan "Geoinformation from one source" the geoscientific basis for deployment of the armed forces can be created and the fulfilment of all space-related tasks of the Federal Armed Forces can be guaranteed. AGeoBw works in close partnership with the state survey offices and the Federal Government for this purpose.

Federal Ministry for Transport, Building and Housing (BMVBW)

Bundesministerium für Verkehr, Bau- und Wohnungswesen

Since 1950, the BMVBW has been a member of the Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany (AdV). The BMVBW engages the Federal Water and Shipping Authority (WSV) as a specialist authority with its own surveyors for the operation and maintenance of federal waterways with a length of 7300 km. Just under 500 employees are engaged in the surveying and real estate division. Nationally, official surveying tasks are carried out that require close consultation with the AdV. The WSV holds its own basic network (position and height stations) and on the rivers Rhine and Main, operates its own SAPOS® stations that are integrated into the satellite positioning service of the AdV. For the waterway network, a digital, object-oriented map system (1 : 2000) is created and updated, the information of which is used to update the ATKIS® basic DLM. The BMVBW is represented in the AdV by the railways and waterways division.

Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany (AdV)

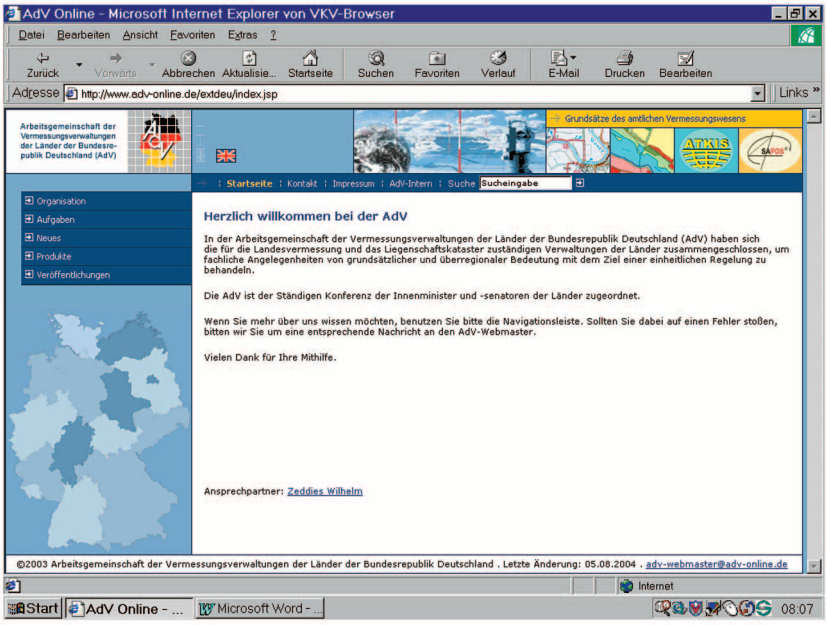
Plenum		
Members: Baden-Württemberg, Bayern, Berlin, Brandenburg, Bremen, Hamburg, Hessen, Mecklenburg-Vorpommern, Niedersachsen, Nordrhein-Westfalen, Rheinland-Pfalz, Saarland, Sachsen, Sachsen-Anhalt, Schleswig-Holstein, Thüringen, Federal Ministry of the Interior, Federal Ministry of Defence and Federal Ministry of Transport, Building and Housing		
President	Advisory Group	Secretary General

↕

Working Groups (AK)			
Spatial Reference	**Real Estate Cadastre**	**Geo-Topography**	**Information and Communication Technology**

Responsibilities of AdV

- Elaboration of recommendations and binding regulations for a uniform approach to establishment, maintenance and further development of the geodetic basis, of the topographic survey, of ATKIS®, of the topographic map series and of the real estate cadastre
- Joint carrying out of state-overlapping projects
- Cooperation in development and application of new technical methods
- Comments on draft bills
- Discussion of questions related to organisation, staff, training, examination and discussion of issues concerning costs, licensing and use rights
- Cooperation with relevant authorities and administrative bodies and institutions of geodetic science and education
- Representing the interests of the official surveying and mapping in the European Union and in international institutions, and
- International cooperation, also in the field of development aid.



Further information:

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ÖbVI	**www.bdvi.de**
ArgeLandentwicklung	**www.argeland.de**
Forschung, Lehre DGK	**www.dgfi.badw.de**

2 Joint Setup of the GDI-DE by the Bund (Federal Government) and the Länder (states of the Federal Republic of Germany)

Through the joint setup of the Geodata Infrastructure Germany "GDI-DE" by the Federal Government, the states (Länder) and communes/municipalities the potential of geoinformation is strengthened, primarily with regard to political, administrative, and economic decision-making processes. Modernization of administration is ad-vanced, decisions in all sectors and fields of society are supported and value-adding services of industry initiated.

The head of the Office of the Federal Chancellor, the heads of the Minister Presidents' Offices, and of the Senates' Offices in Germany (CdS) adopted on 27 November 2003 a resolution on the establishment of the GDI-DE as well as on the future organisation of the GDI-DE. Within a GDI-DE Steering Body representatives of the Federal Government, the Länder and the Central Associations of Local Authorities shall assume the political/technical and conceptual guidance of the development of the GDI-DE.

Within the Steering Body of the GDI-DE representatives of the Federation, the states and the communes - shall, under the political responsibility of the undersecretaries for e-government, direct and coordinate the further development and overall design of the Geodata Infrastructure Germany in and for all administrative levels, and on a cross-departmental basis. The Steering Body GDI-DE shall elaborate a harmonized concept allowing an open setup of a Geodata Infrastructure in Germany in the spirit of partnership, and also in the light of a European Spatial Data Infrastruc-ture still laying ahead and waiting for realization in the foreseeable future. Above all, this Body shall promote the strategies in part already existing and those being developed in the course of time and coordinate them for the purpose, benefit and needs of the setup of the Geodata Infrastructure as specified above, which means on the levels of the Federation, the states, and the communes/local authorities. Further, the task of this Body shall consist in providing support to the Federal Government in its efforts to push ahead the further development of standardization on a sustainable basis and across states boundaries.

The GDI-DE Steering Body defines the model projects required to establish and operate networked geoportals, to realize a networked metadata information system and for a sustained activation of cooperation of public and private including scientific actors in the field of geoinformation. It coordinates the realization of all projects according to the motto "some-for-all". It ensures the transfer of knowledge and process solutions among the states, the communes and the Federal Government.

Practical implementation of this work will be assisted by a secretariat and coordination-centre GDI-DE through an appropriate project management. It is planned to fill this secretariat and coordination-centre with representatives both from the Federation and the states. Existing facilities and structures shall be made use of and parallel or double work be avoided. Moreover, with regard to practical work it is of importance that in a decentrally organized structure typical of geoinformation the projects serving the establishment of the GDI-DE are supported also by the competent data holders and users.

The role of the AdV (Working Committee of the Survey Authorities of the States of the Federal Republic of Germany) within the Bund-Länder Organisation GDI-DE

The AdV has made a substantial contribution to the elaboration of the new organisational structure. Further cooperation of the Survey Offices/Authorities of the states is guaranteed via the projects carried by theState Survey Offices within the frame of the GDI-DE. This is a perfectly smooth transition from the cooperation taking actually place of the AdV with the Interministerial Committee for Geoinformation (IMAGI).

Further, the AdV plays an extraordinarily important role in the development of necessary procedures and technologies as well as in the distribution and application of norms and standards. In this context the ISO-based A-A-A data model must be mentioned in particular. It describes in a future-oriented manner the structure and setup of basic geodata and constitutes a prerequisite for the integration of expert data.

Thus, with the A-A-A model a fundamental technical and practical contribution for the GDI-DE is made. Vice-versa, the development of the GDI-DE using the A-A-A concept will bring about a consiberable impetus for its further dissemination and application.

Recent work of the AdV

As part of dealing with spectal issues and taking a uniform, cross-state approach to problems, the bodies of AdV concentrated essentially on the following key activities during the reporting period.

Spatial reference

The AdV is involved, represented specifically by the Federal Agency for Cartography and Geodesy (BKG), in various international projects working on the realisation of the spatial reference. This guarantees the link between the national spatial reference to international, global reference systems.

As well as conventionally marked reference point fields, the national spatial reference for location and height is also provided with modern technology based on the satellite positioning service SAPOS®. Especially through the nationwide networking of SAPOS® reference stations, accuracies of better than ±2 cm are achieved with realtime position determination. SAPOS® enables height determination in the official system in realtime with an accuracy of around ± 3 cm. The conventionally marked fixed point fields will therefore lose significance in the future.

Data submission via the central SAPOS® agency for nationally engaged users has entered the production phase and is being further expanded.

Preparations for repetition measurement of the German Main Height Network (DHHN) is now being discussed within the AdV.

Link to global reference systems

As part of the Satellite Geodesy Research Group (FGS), the BKG is significantly involved in the activities of the international services of the International Association for Geodesy (IAG) through essential contributions for data collection, data maintenance and data analysis.

As part of the International GPS Service (IGS), the BKG maintains the permanently erected GPS stations that are incorporated into the national, European and global network and also a regional data centre that concentrates on managing the European IGS stations.

For the International VLBI Service (IVS) and the International Laser Ranging Service (ILRS), the BKG provides observations from Fundamental Station Wetzell, the Transportable Integrated Geodetic Observatory (TIGO) in Concepción/Chile and in the case of the VLBI also from the O'Higgins Antarctic Station. In addition to the observations from Fundamental Station Wettzell, the BKG has also since May 2002 been operating jointly with a Chilean Consortium in Concepción/Chile the TIGO developed in Wettzell, which is equipped with VLBI, SLR and GPS-GLONAS systems and also local sensors, gravimeters and seismometers. VLBI and permanent GPS/GLONASS measuring campaigns are carried out at Station O'Higgins, which is operated jointly by the BKG and the DLR (German Centre for Aerospace).

For the IVS, the BKG operates one of three global data centres and for the ILRS and IVS, analysis centres that determine the regular solutions for the ITRF (International Terrestrial Reference Frame), the earth rotation parameters and in the case of VLBI additionally the ICRF (International Celestial Reference Frame).

In order to satisfy the increasingly stringent requirements in the field of laser range finding, which are largely attributable to the rising number of satellites to be observed, a new laser range finding system is

currently being built for Fundamental Station Wettzell, which is due to be commissioned in 2007.

The central office of the International Earth Rotation and Reference System Service (IERS) managed by the BKG is building a Data and Information Centre that will transfer the IERS Production Information obtained from a complex system of measuring and evaluation procedures to the user professionally and on time (http://www.iers.org). In addition to the preparation and provisioning of information in electronic and printed formats, the compiling of records and reports and the routine and coordinating tasks of the central office are also organised for the IERS Workshops to enable scientific knowledge, redefined standards and resolutions to be practically implemented for the IERS Product and Research Centres and the IAG.

At the Center for Orbit Determination in Europe (CODE), the BKG is involved in the designation of precise GPS orbits. Precise GLONASS orbits are provided on a weekly basis as part of the International GLONASS Experiment (IGLOS) of the IGS.

As the EUREF Analysis Centre for the European Permanent Network EPN, the BKG contributes towards maintaining the standardised, European Reference System recommended by the European Commission. Coordinates and troposphere parameters from national sub-networks are merged to create an overall standardised continental solution.

National geodetic spatial reference

To provide the spatial reference using GPS, the AdV has set up the nationally standardised satellite positioning service SAPOS®. The professed aim of SAPOS® is to provide through modern technology a standardised, homogenous spatial reference system for all tasks of surveying, mapping and cadastral systems and also for other applications. This should be regarded as being part of the legal remit of the surveying authority and serves the infrastructure-based supply for all citizens.

SAPOS® is based on a widespread network of more than 250 GPS reference stations that were intended as reference points of the state survey based on a diagnostic adjustment within a homogenous, standard reference system of the European Terrestrial Reference System 1989 (ETRS89).

SAPOS® offers its customers four distinct service applications with varying degrees of accuracy. The strongest demand is for SAPOS® HEPS, the highly precise, realtime positioning service with centimetre accuracy.

- Transmission via GSM was introduced as compulsory standard for the data transfer, with the 2-m-band radio and data submission via the Internet using NTRIP (Networked Transport of RTCM via Internet Protocol) as options.
- For the data format, RTCM 2.3 with data type 20/21, unencrypted and uncompressed was introduced as an obligation. As an option RTCM AdV, encrypted and compressed and/or RTCM 2.3 with data type 18/19 unencrypted and uncompressed was introduced.
- Realtime networking was introduced to enhance the reliability and accuracy of the realtime service SAPOS®-HEPS. It solves the problem of residual errors caused by the influences of ionosphere and troposphere and also errors in the orbital data. Regarding the distance-independent correction data, the process of the area correction parameters (FKP) was introduced as an obligation and the process of the virtual reference station (VRS) was introduced as an option.

The charges for the data of all SAPOS® services are standard throughout Germany.

In view of the objective to have a nationwide, Internet-based service for positioning and navigation accuracy to ± 0.5 m, 17 of the 20 stations in the German GPS Reference System GREF managed by the BKG have been linked to the host station in Frankfurt am Main through permanent lines. The GPS receivers used are all being replaced by GPS-GLONASS receivers. Networking is realized via telephone or Internet with the GPS-Net-Software offered by Trimble/Terrasat. From the obtained data, type RTCM 2.0 correction data are derived for virtual reference stations that are located uniformly throughout the Federal Republic of Germany.

The activities of the BKG are embedded under the designation EUREF-IP in pan-European endeavours to submit RTCM data via the Internet. An accuracy of ±1 m is anticipated. Institutions from 15 European states have been involved in this project to date.

At the conference of the AdV Plenum im September 2002, the BKG was engaged to conduct a special

diagnostic analysis of all SAPOS® reference stations. The aim was to eliminate any non-homogeneity in the ETRS89 coordination by deriving a consistent block of coordinates with an accuray of about one centimetre. In accordance with the contract, the BKG defined the coordinates for all of Germany on the basis of observations made by GPS Week 1188. They were transferred to the official realisation of the DREF via a 7-parameter Helmert transformation and have now been introduced by the federal states as the new official coordinates.

The SAPOS® sub-networks of the states are being integrated by the BKG into the national GREF network and also the European EUREF and the global IGS network. These activities are being carried out to define individual deviations for repeated monitoring of the official coordinates of the states.

To enhance the cost-efficiency and acceptance of SAPOS®, the AdV has now built a central SAPOS® agency for data marketing in the State Survey and Geospatial Basic Information Lower Saxony (LGN) in Hanover. The task of the central SAPOS® agency is the nationwide merger of all SAPOS® data from the state centres, a nationwide provision of SAPOS® data for users and the creation of nationwide rights of use and compensation arrangements. The central SAPOS® agency supports the AdV in the co-ordination of nationwide activities. It is the contact and negotiation partner for users throughout Germany and is also used for the exchange of SAPOS® data between the states in line with their requirements.

The websites of the information system for the European Coordinate Reference Systems CRS have been redesigned and expanded so that information on the national height systems and its relation to the European height system EVRS2000 can also be provided in the future. The transformation parameters required for this purpose have been coordinated with the national surveying authorities.

The German First Order Levelling Network DHHN92 is based on observations from the nineteen eighties. Following the development of a project paper for modernisation of the DHHN by the Working Group for Spatial Reference, plans are now going ahead for a levelling partial modernisation by levelling based on the same accuracy standards. Simultaneous, highly precise GPS measurements and therefore ultimately the creation of an integrated reference point field within the DHHN are being planned.

The quasi geoid for the Federal Republic of Germany was provided to the Federal States in March 2003. The model was calculated from 250 000 gravity values and 675 quasi geoid heights at GPS/levelling points and based on an aj adjustment of point masses. The partnership with the Institute of Earth Surveying at the University of Hanover (IfE) intensified its activities in the field of geoid modelling. Comparisons were made between the models of the IfE and the BKG. In the lowlands, the differences between the models are generally less than 1 cm.

As an alternative to point mass illustration, work was carried out on deriving analytical geoid and gravity models. In June 2003, an analytical gravity model for East Germany was completed using 11 000 gravity values.

To safeguard the gravity reference system for the Federal Republic of Germany in terms of level and scale, the BKG conducts regular absolute gravity measurements in combination with continuous recordings from the supra-conducting gravimeters in Wettzell, Bad Homburg and Moxa (station at the University of Jena). Revision measurements at stations in the German gravity network enable any gravity variations occurring in the µGal area to be indicated.

Figure 1: Overview about the SA*POS*® reference stations in the Federal Republik of Germany

Real estate cadastre

The modelling of the Authoritative Real Estate Cadastre Information System ALKIS® is complete and some states have already embarked on realisation and/or implementation. ALKIS® enables the official German surveying to better satisfy the customers´ requirements on geographic reference data of the real estate cadastre. The surveying authorities are already giving time and attention into the requirements of data users. The introduction of ALKIS® also took into account the requirements placed by official statistics on land use registered in the real estate cadastre for continuity. It was also possible to derive standard georeferenced addresses from the digital inventories of the real estate cadastre and submit them nationwide as so-called "house coordinates" via a central agency.

ALKIS poised for implementation

ALKIS®-implementations and detailed migration concepts of the states result in a sequence of modifications in the ALKIS® technical scheme. Ideas and change requests are therefore recorded centrally in a revision list and processed using an established method by the Revision Committee in close collaboration with the Real Estate Cadastre Working Group, insofar as technical changes fall under its field of responsibility. Version 3.0 of GeoInfoDok was published in early May 2004. In addition to the updated ALKIS® portrayal catalogue, this version also contains extensive and detailed technical explanations on the ALKIS® concept.

The ALKIS® portrayal catalogue was also published with a group of examples (see Figure). GeoInfoDok thus defines not only the data interface (NAS) and technical content, it also features a modern and standard layout for the presentation tasks derived from ALKIS®. The journey from the ALKIS® primary database data through to actual presentation (rules of derivation) is also described.

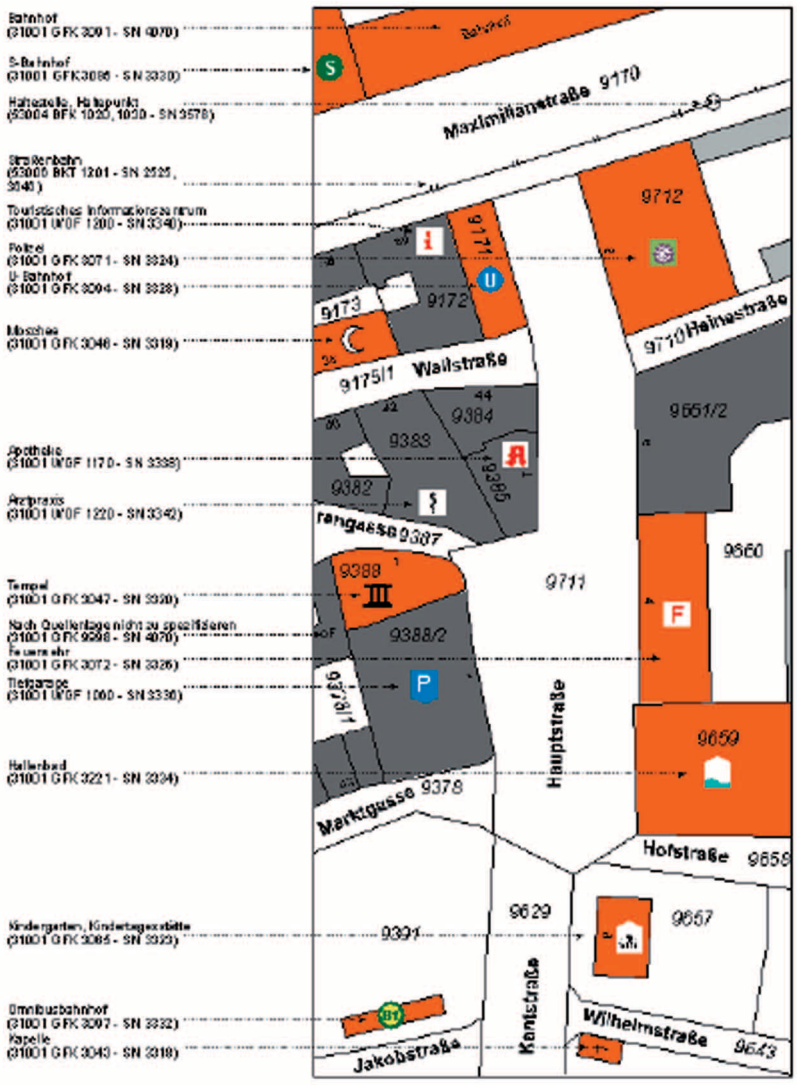

Figure 2: ALKIS®- portrayal catalogue (example)

An information event was held in Nuremberg on 29th and 30th September 2003 with a view to presenting in detail the continued development of the ALKIS® technical concept to all member authorities of the AdV. The discussion clarified the need for further and more importantly detailed agreements. The Real Estate Cadastre Working Group will therefore intensify the flow of information to the member states.

Collaboration with the statistics authorities

Besides the survey of area to be carried out on a four-year basis for the interim periods, the August 2002 version of the new agricultural statistic law also stipulates an annual statistic for residential and traffic areas, whereby the affected utilisation types represent part of the "Minimum publication program of the Federal Statistical Office". The surveying authorities also provide – as for the quarterly general area data collection – aggregated areas for the individual utilisation types at district and local authority level.

Implementation of the ALKIS® concept by the surveying authorities of the federal states will have a significant influence on the official area statistics and will now longer allow them to be continued in the known format. On the other hand, the future-facing modelling of actual land use in ALKIS® will create benefits for official statistics through a considerable information growth in the core data to be standardised throughout Germany.

As it is particularly important for the statistics authorities to continue their official area statistics during the transitional period and until the widespread introduction of ALKIS® has been achieved, a solution has been developed that permits ALKIS® data to be returned to the organisation scheme of the previous official statistics. The results are set out in a "concept for converting area data collection in accordance with the agricultural statistics law based on modelling of the actual ground use in ALKIS®.

The conversion concept also caused the inventory of utilisation types modified by the AAA-modelling to be merged from a technical viewpoint into its own organisation scheme. This new utilisation type catalogue describes, in conformity with the ALKIS® feature type catalogue, the utilisation types systematically and hierarchically organised into a format that is clearly understandable to outsiders and that contains the corresponding conceptual definitions.

The utilisation types registered in the real estate cadastre must, from the statistics authorities' standpoint, be able to swiftly and reliably illustrate trends and make forecasts. Issues, for example following development of the residential areas and the progressive sealing of the ground (headword "area consumption") must be clarified so that the political level can implement control initiatives in good time.

The Federal Statistical Office and the Real Estate Cadastre Working Group have compiled a coordinated paper (solutions for appraisal and improvement of the actual ground use shown in the real estate cadastre) on this theme.

In order to keep real estate cadastre data as current and complete as possible for statistical purposes, any changes to the actual land use must be recorded at the earliest possible stage. This applies also to changes that are not accompanied by surveying activities and thus not recorded with reference to a cause. However, as personnel capacities are extremely limited and a periodic and systematic verification of the utilisation type is barely to manage, technical priorities have to be set and an intelligent information management has to be organised by exhausting appropriate external sources. This is supported specifically by the ability created in ALKIS® to register utilisation types wholly independently of the land parcel geometry. The aim of definitive measures is, for example, to realise a common data collection process for ATKIS® (high degree of topicality) and ALKIS® and also to achieve agreements with the road construction, agricultural and forestry authorities for the automatic exchange of the area utilisation objects carried by them. Thus, in the interests of keeping data up-to-date, technical and qualitative limitations (e.g. reduced geometric accuracy, reduced recording level) compared to the currently valid standards must be accepted and recording using metadata.

Delivery of house coordinates beyond state boundaries

The users of geographic reference data demand that official German surveying provide real estate cadastre data from beyond the state boundaries from just one source. Since early 2004, the state surveying authority of North Rhine-Westphalia as a central agency has been providing georeferenced address data – referred to in short as "house coordinates" –

from the states of Bavaria, Hesse, Lower Saxony, North Rhine-Westphalia and Rhineland-Palatinate to cross-state customers and also on behalf of the states, concluding licensing agreements with these customers. The provision of data and assignment of user rights has been regulated since December 2003 in a administration agreement with these states; other states intend to follow suit in the near future. The offer of central data distribution is being accepted positively and appraised by the customers.

The “house coordinates” product provides the users with data for a wide variety of applications. This data can be used for routing services, search services, market development, market research, risk assessment in the insurance industry and many other applications. The house coordinates of the surveying authorities are therefore ideally suited because, as well as being well up-to-date, they also offer an extremely precise georeferencing of the address that is not based on an interpolation procedure widely available on the market (inaccurate).

Figure 3: Visualisation of georeferenced address data – Combination with the ALK/DFK

Geotopography

The necessary increase in topicality and customer-oriented distribution of geographic reference data confront the surveying and mapping authorities with additional challenges. With the completion of the "Geodatenzentrum" (geodata centre) at the BKG and the progress in specific state "geodata portals", data and metadata can be offered to a wider circle of users. Now as ever, an animated exchange of ideas regarding dealing with access conditions and extending usage conditions is pending. The draft concepts and strategies for the increasing topicality of geographic reference data are being put into practice.

Digital landscape models

The structure of the digital landscape models and their current management continues to be a key task of German state surveying. Due to the high level of public and private interest in a standardised Germanwide ATKIS®-Basis-DLM as an integral component of the national geotopographic database, the state surveying authorities have set the objective of completing the third and final implementation stage to complete the database by the end of 2006. Version 3.2 of the feature catalogue published on 1 July 2003 is available for this realisation stage. The database of the ATKIS®-Basis-DLM is the platform from which small-scale digital landscape models ATKIS®-DLM50, 250 and 1000 and digital topographic maps to scales of 1:10 000 and 1:25 000 are derived.

To derive the DLM50, the states and the federal government have concluded an agreement on the basis of which the state surveying authorities are to create a digital, cartographically generalised landscape model with a resolution of 1:50 000 (DLM50/2) and provide to the BKG for use on federal authority tasks by the year 2006. Version 2.0 of the feature catalogue published on 1 July 2003 is available for this DLM50.

The feature catalogue for the DLM250 and DLM1000 is currently being modified in line with the basic OK Version 3.2 and the OK50 Version 2. In addition to the seamless modelling over all resolution levels, compatibility with the EuroRegional Map 1:250 000 and EuroGlobalMap 1:1 000 000 landscape models is a further focal point. Furthermore, the requirements of the AGeoBw are being incorporated into developments in respect of future civil-military products.

The ATKIS®-DLM250 and the ATKIS®-DLM1000 created in the Federal Agency for Cartography and Geodesy (BKG) are widely available in the first realisation phase and are updated annually. The content is continually updated for the creation of the EuroRegionalMap and EuroGlobalMap Eurogeographics projects and for linking technical data. Thus, in the DLM100 for example, the preconditions for linking hydrological technical data with the water network on the basis of the EU water framework directive have been created in close collaboration with the federal environmental agency, the federal agency for hydrology and the federal state establishments responsible for the waters.

The state surveying agencies and the BKG endeavour to safeguard the topicality of crucial topographic data in the sub-year area. They are therefore setting up a close co-operation with the parties responsible for the topographical changes and also using photogrammetric and computer-controlled terrestrial reconnaissance systems.

Implementation of the continuous object structuring of real estate cadastre data and of geotopography as part of the AFIS®-ALKIS®-ATKIS® concept is crucial to the further development of the ATKIS® project. To modify the ATKIS® technical concept, the intention is to transfer the feature catalogues to the common data model in 2004.

Digital terrain model (DTM)

The state surveying offices use digital terrain models with varying levels of accuracy. As a result of its computerised merger in the BKG, a homogenous DTM with a terraine-type dependent height accuracy of ± 1 to 3 m is currently being developed for the area of the Federal Republic of Germany. The grid width of this terrain model is 50 m. This ATKIS® -DTM-Germany will be available during the course of 2004.

For the DTM offered by the state surveying authorities and the BKG, the data interchange instrument has been updated by provisions for the morphological structure data so that a nationally standardised provision of the DTM in its essential specifications can be guaranteed.

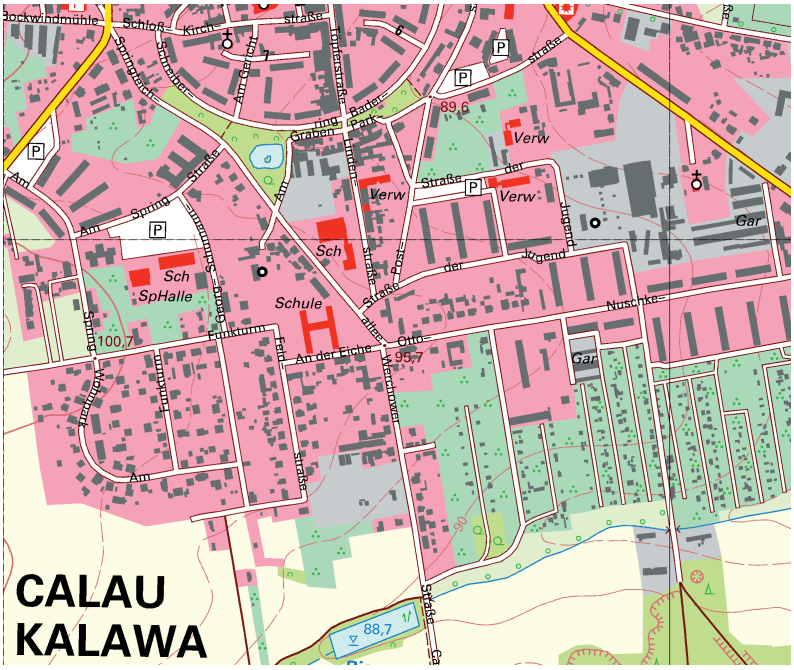

Figure. 4: Section of the digital topographic map 1:10 000 (ATKIS-DTK10)

Following an evaluation of the high-water catastrophes in the Danube, Elbe and tributaries in August 2002, initiatives have been introduced with a view to avoiding or at least reducing future claims based on flooding in federal territory. One of the initiatives focuses on recording and holding data for reliable high-water simulations, which are provided for use by the responsible federal and state authorities and the "German emergency provision information system" (deNIS). This requires that highly-accurate, surface-related height data (standard height deviation 0.2 to 0.5 m) are to be created for the potential flood areas of federal territory in close co-operation between the BKG and the responsible state surveying agencies and integrated into ATKIS"-DTM-Germany.

Digital topographic maps

The currently available digital landscape and terrain models provide the states and the government with the tools for deriving the topographic serie on the basis of new map graphics documented in the ATKIS® portrayal catalogues. New digital topographic maps (DTK) on scales of 1: 10 000 and 1 : 25 000 are already achieving a high profile in the product range of the state surveying authorities. (Figures 4 and 5)

Although the portrayal catalogue for the future DTK on a scale of 1:50000 is available, the map graphics and portrayal catalogues for the DTK on scales of 1:100000, 1:250000 and 1:1000000 are still under construction. Until the topographic map serie to be created on the basis of the ATKIS® portrayal cataloguesis available, the states and the federal government will update and hold in the map printing device and raster data record conventional topographic map series for diverse applications.

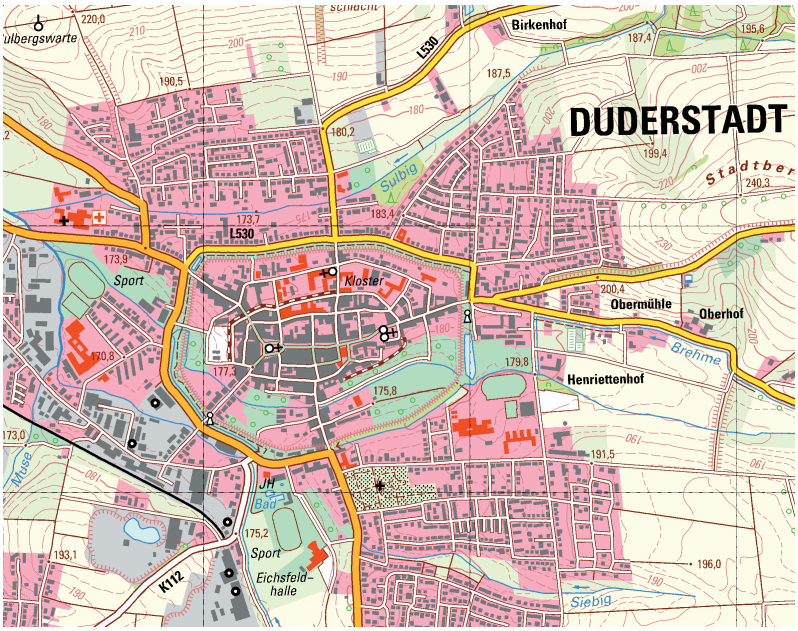

Figure 5: Section of the digital topographic map 1: 25 000 (ATKIS-DTK25)

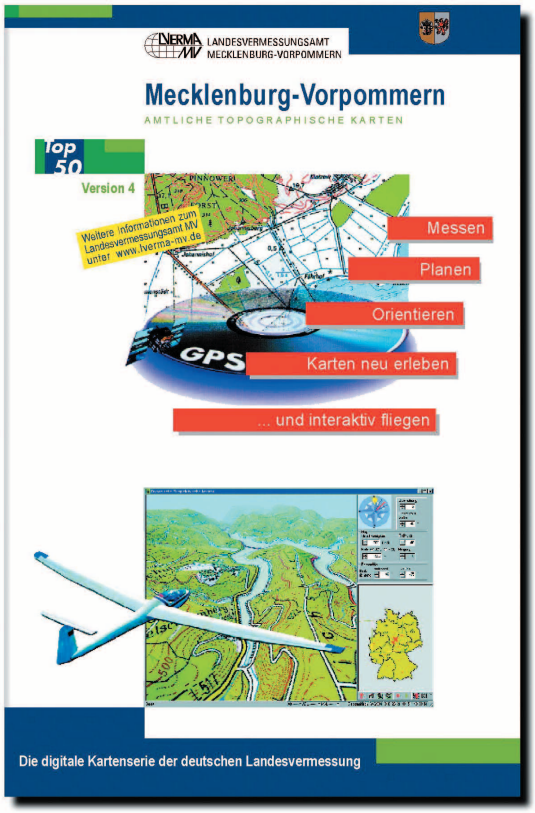

Figure 6: The CD-ROM Top50 with overflight and 3-D functionality has successfully established itself on the market as a product of the German state survey.

Interactive topographic maps on CD-ROM

The CD-ROM series published for the whole of Germany by the federal government and the states, which presents via software the raster data of the topographic map 1:50,000 and topographic overview map 1:200,000 under the trademarks "Top50" and "Top200", enjoyed continued success on the market in 2003. A contributory factor in this respect is that Version 4.0, which the states started to publish in 2003, can offer a further expansion of functionalities. It is now possible to take a virtual flight over Germany. This concept is based on a dynamically perspective depiction of the state areas being superimposed on the three-dimensional terrain model known from Version 3.0.

Toponymy

The Permanent Committee on Geographic Names (StAGN) is focussing on standardising the official and private use of geographic names in the German-speaking zone. These activities are taking place in close collaboration with the United Nations Expert Group for geographic names. In 2003, the StAGN held two meetings, the 113th StAGN Meeting in Eupen in the German-speaking community in Belgium and the 114th in the State Survey and Geospatial Basic Information Lower Saxony in Hanover.

The collection of geographic names in the German coastal waters will shortly be completed. The list will be published in four map pages on a scale of 1 : 200 000, which will be edited by the respective state surveying authorities. The following pages are proposed:

Sheet 1	–	Lower Saxony coast
Page 2	–	Schleswig-Holstein west coast
Page 3	–	Schleswig-Holstein east coat, west Mecklenburg coast
Page 4	–	Mecklenburg and Westpomerian coast

A digital draft of the Lower Saxon coast is available.

In September 2003, the StAGN and a delegation from the Department of Language Information Administration of China agreed mutual support for the correctly modified pronunciation of Chinese and/or German geographic names.

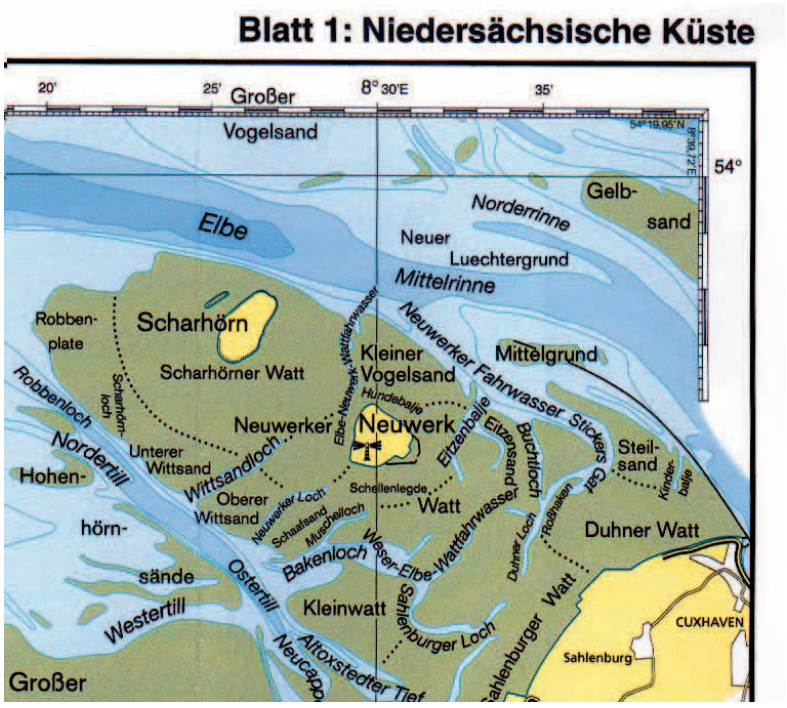

Figure 7: Collection of names in the German coastal waters (extract from Page 1 – Lower Saxon coast)

Copyright and Sales

The geodata centre, established in the BKG distributes the digital ATKIS® landscape and terrain models and the digital topographic maps both cross-state and throughout Germany in a harmonised format. The download area of the geodata centre's Internet portal www.geodatenzentrum.de offers test data and a web-mapping server for direct access to data inventories and their spatial structuring. A link to the Internet portals and online shops of the states is guaranteed. A GeoMIS.Bund metainformation system based on the ISO standard has also been set up. This will be supplied with metadata directly from the states and will also be networked with its own metainformation systems. Since September 2003, an online ordering system has enabled geodata to be requested from the geodata centre via the Internet and federal institutions can even obtain the data online.

Public relations work, trade fairs and exhibitions

During the process of creating geodata infrastructures in the Federal Republic of Germany, the AdV recognised the need to raise the level of awareness for products offered by the state surveying authorities (geographic reference data). As in previous years, the German state survey, represented by the AdV, appeared on stands in Hamburg at INTERGEO® at the international trade fair for surveying (Figure 8) and at the book exhibition in Frankfurt am Main. Besides the presentation of state survey products, supporting lectures and discussions were also held. The AdV has decided to step up its public relations work using Public Relations and Marketing tools. As the first effective public relation exercise, a questionnaire has been jointly created with the BKG. This will be used to research the application potentials of official geographic reference data and also obtain knowledge for customer-oriented development of these products and how they are marketed. The survey will be conducted in 2004.

"Knowledge-based photogrammetric-cartographic workstation" (WIPKA) development project

As part of the "Knowledge-based photogrammetric-cartographic workstation" development project, various institutes of the University of Hanover collaborated with the BKG to define the concept of a Multiple Representation/Resolution Data Base

Figure 8: The geodata of the German state survey is presented at exhibitions and trade fairs on a joint stand of AdV, in this case at Intergeo 2003 in Hamburg.

(MRDB). A prototype now exists for the integrated data maintenance of the DLM250 and DLM1000 landscape models. In the next phase of the project, the prototype will be expanded by other ATKIS® landscape models and methods for automated updating. In a further sub-project under the common umbrella of WIPKA, the Technical University of Munich is involved in developing procedures for the integration of geographic reference data and technical data. The procedures are tested using the example of house coordinates and street data.

The development work for a quality control system of the Basis DLM from knowledge-based aerial photograph interpretation has progressed.

Information and communication technology

Information and communication technology forms the technical interface between operations in the field of spatial reference, real estate cadastre and geotopography. For the period covered by this report, the activities of the AdV working group have focussed on information technology work as part of further developing the AFIS®-ALKIS®-ATKIS® concept for the modelling of geoinformation of official surveying and mapping. The key activities are the continued development of the AFIS®-ALKIS®-ATKIS® basic scheme and NAS, the standard-based data interchange interface and also the information technological support of the AdV model projects for trialling the network of official geographic reference data and geotechnical data.

Version 3.0 of "Documentation on modelling the geoinformation of official surveying and mapping – GeoInfoDok", the result of a comprehensive revision management with GIS manufacturers and users, has been published on the Internet under www.adv-online -> publications -> AFIS®-ALKIS®-ATKIS® project.

Further development of the AAA basic scheme

The AFIS-ALKIS-ATKIS basic scheme (AAA basic scheme) forms the basis for the technical application scheme for the modelling of AFIS, ALKIS and ATKIS objects and for the data interchange process. Being a neutral entity, other technical information systems can also use the classes defined in the basic scheme for modelling (e.g. land register, rural development). It is therefore the intention for 2004 to create a code of practice for the linking of technical information systems to the AAA basic scheme. During the reporting period, the basic scheme was further developed based on knowledge garnered from the conceptual follow-up work of the AdV project groups and in consultation with the GIS manufacturers. This includes the re-modelling of the model type code and the transfer relations and also the definition of the date and time data character.

Further development of NAS – standard-based data exchange interface

Version GML 3.0 of the Geography Markup Language (GML 3.0) approved by the OGC in January 2003 has served to upgrade the encoding specifications, most importantly for the geometry scheme, to such an extent that all NAS-relevant requirements are now included in GML. The NAS has now been modified in line with the new standard. The NAS 2.0 version is therefore fully GML-3 compliant. Completely new schemes for the NAS have thus been created. The OGC Web-Feature-Service (WFS) und Filter Encoding stipulations will continue to be used for the maintenance functions. Filter Encoding in combination with a small number of AdV-specific updates are used in consultation with the GIS manufacturers for the formulation of selection criteria. These upgrades conform to the further development proposals for Filter Encoding that exist in the OGC for agreement. An ISO/GML Working

Group is currently working on a common version of ISO/GML. This would then offer ISO conformity for a further developed GML. From a current viewpoint, NAS 2.0 would require only minor changes to bring the NAS in line with the subsequent ISO conformity.

De-facto and de-jure standards for AdV model projects on geodata infrastructure

Under the terms of the German geodata infrastructure project (GDI-DE), the AdV Plenum decided to trial the networking of public geographic reference data and geotechnical data in several model projects. The Information and Communication Technology Working Group is providing the relevant IT support. The standards of the Open GIS Consortium and de-jure standards of the ISO/TC211 are applied in order to guarantee interoperability of geodata infrastructure projects. As part of reviewing both existing and developing de-facto and de-jure standards for the GDI, those to be retained for the model projects have been identified and compiled in a list. It became clear during the activities that the "Infrastructure for Spatial Information in Europe (INSPIRE)" initiative is expected to have a major retroactive effect on GDI developments in Germany. INSPIRE is a European Commission initiative that is to square up to the current problem of a split, hetergenous and largely inaccessible geodata basis in Europe. The objective is European-wide availability of harmonised and high quality geodata. The INSPIRE position paper "Architecture and Standards" already provides a detailed list of de-facto and de-jure standards for geoinformation and the creation and operation of geodata infrastructures. This paper could be used as a basis for the list of AdV model projects.

De-jure and/pr de-facto standard	INSPIRE							AdV-Model Projects			Status Stand: 05/03 IS = international Standard DIS = Draft international Standard TR = Technical Report DTR = Draft Technical Report CD = Commitee Draft WD = Working Draft DCIS = Draft Candidate Implementation Specification DIPR = Draft Interoperability Program Report
	Publish & manage	Find	View	Delivery	Analyse	Multi-lingual	e-Business	Networked Metainformation system	Networked ground reference values information system	Integrated presentation of distributed existing geographic reference data geo technical data	
ISO / TC211 Geographic Information - Geomatics											
ISO 19101 - Reference model	Inf	Inf	Inf	Inf	Inf	Inf	Inf	Inf	Inf	Inf	IS: 2002
ISO 19102 - Overview											deleted
ISO 19103 - Conceptual scheme language											DTS
ISO 19104 – Terminology											DIS
ISO 19105 - Conformance and testing											IS: 2000
ISO 19106 - Profiles											DIS

Figure 9: Excerpt from lists of de-facto and de-jure standards for AdV model projects

Information and technological coordination of GDI activities

At AdV level, the creation of a GDI requires the information and technical coordination of GDI activities and at expert level, a review of IT developments. All activities must be grouped, coordinated and standardised within the AdV, in order to synchronise application profiles for geographic reference data and technical data with geodata providers and users and incorporate into the standardisation bodies. The Information and Communication Technology Working Group has taken up this subject as one of its key activities.

3 Cooperation in National and International Organizations

Eurogeographics

Eurogeographics, the association of the national Surveying, Mapping and Cadastral Agencies (NMCAs) has as its primary goal the setup of the reference data (basic geodata) of a European Spatial Data Infrastructure (ESDI) and the achievement of interoperability.

Within the frame of Eurogeographics BKG cooperated above all in the preparation of the products SABE (Seamless Administrative Boundaries of Europe) in its role as a Project Coordinator, as a Regional Coordinator with EuroGlobalMap, and as a Partner with EuroRegionalMap.

The SABE product has been on the market since 1996 and has been continuously revised by BKG during the years following its introduction. All five versions issued since then are available at the application scales 1:100 000 and 1:1000 000. In the period under review the 2nd edition of the SABE2001/Census product has been completed. It contains the geometry, the names as well as the key-numbers of more than 136 000 administrative units from 35 European countries, the data of this version referring to the date of census in the country concerned. Beyond the provision of data BKG offers technical support to interested persons and customers as well as an up-to-date user manual and a sample dataset for downloading on the web page http://www.eurogeographics.org/eng/04 sabe.asp.

The projects EuroRegionalMap and EuroGlobalMap promoted by the EU could be successfully concluded in October 2003 and March 2004, respectively. Within the frame of the project mentioned first a demonstration dataset at the 1:250 000 scale was established comprising 7 countries in a first stage, which shall now be developed further step-by-step to its final coverage of the whole of Europe. In the second project the 2nd version of the dataset 1:1 mio, covering with 36 countries already the largest part of Europe, was completed in the beginning of 2004. Within the scope of these projects an online-ordering and distribution system for European datasets was developed, which is based on the relevant national online-ordering and distribution system (see www.eurogeographics.org/eng/04_buying.asp). Moreover, BKG provided the metadata profile for EGM and ERM according to ISO 19115, which is suited for implementation into the metadata system EuroMapFinder of Eurogeographics.

A Technical Expert Group directed by BKG has started work with the objective of harmonizing the specifications of the aforementioned small-scale products taking into account the overriding aims of INSPIRE and EuroSpec, taking the adaptation of the data catalogs already pursued by BKG as basis.

EuroSpec constitutes a strategic project of Eurogeographics with the aim of pushing ahead the harmonization of data specifications of data and relevant services, which is required in the light of realization of the European Spatial Data Infrastructure. For this purpose Eurogeographics has established a Coordination Croup comprising high-rank experts of the member organisations. This group ensures the

required harmonization between the existing working groups and attends to the preparation of future projects.

In the autumn of 2003 the 3rd Plenary Assembly of Eurogeoraphics took place in Istanbul, on the occasion of which the President of BKG, Prof. Dr. Dietmar Grünreich, was elected President of Eurogeographics.

Online-harmonization of topographic base data

The research project “Geospatial Info-Mobility Service by Real-Time Data Integration and Generalisation (GiMoDig)” promoted by the EU has set up a prototype for online-harmonization of geotopographic base data for mobile users. The conceptual scheme underlying the harmonized data was elaborated with the collaboration of BKG. The methods of harmonization have been installed on the server of the Project Coordinator Finnish Geodetic Institute, and linked with the respective user’s telecommunication service as well as with the databases of the authorities involved of Finland, Sweden, Denmark, and Germany. Up-to-date information on this project can be found under http://gimodig.fgi.fi.

Interministerial Committee for Geoinformation (IMAGI)

To improve co-ordination of geoinformation systems within the Federal administration the Interministerial Committee for Geoinformation (IMAGI) was set up in 1998. The IMAGI is composed of representatives of 10 Federal departments. The AdV takes part in the IMAGI session as a permanent guest.

GeoMis.Bund, the first stage of a 3-tier concept for the implementation of a Geodata Infrastructure Germany (GDI-DE) will as a geodata search engine create transparency of geodata inventories existing in authorities and public institutions in Germany (www.geomis.bund.de). In the AdV pilot project “Networked metainformation systems” the GeoMIS.Bund solution has been adopted both technically and functionally, and recommended for the setup of metainformation networks also to the Land Survey Offices.

The IMAGI coordination office and the AdV participate in the preparation of a German application profile for metadata interfaces. Such an application profile is of decisive importance for unproblematic metadata communication between different interfaces, which means despite of existing norms and standards preset by ISO, OGC and W3C.

Linkage of metadata with geodata shall in future be performed via services (ISO 19119), which shall enable direct addressing of the webservices of the geodata (digital maps) from the hit lists of GeoMIS.Bund.

Working Party on Land Administration

Even during the previous reporting period, the AdV was making an active contribution to the activities of the Working Party on Land Administration of United Nations Economic Commission for Europe (WPLA). A representative of the AdV was elected again as a member of the steering committee (Bureau) of WPLA for the official period up to November 2005 and looks after the interests of the AdV within this body.

As well as the WPLA workshops held twice a year, a number of other activities will be carried out and supported by the AdV. These activities will focus on a number of studies regarding fundamental and current specialist subjects of land registration and the real estate cadastre. which will be handled by the relevant Working Groups (Task Forces).

Permanent Committee on Cadastre

The Netherlands took the chair starting from 1.7.2004 in the PCC, after Italy held it for twelve months. On the conference of the PCC at the beginning of December 2003 in Rome the "COMMON PRINCIPLES ON THE CADASTRE IN THE EUROPEAN UNION " were adopted. In the middle of March the agenda for the PCC was adopted.

Since three groups in Europe (PCC - only for the European Union range -, WPLA - priority for east and Southeast-European countries including Russia and further states from the former Soviet Union - as well as Eurogeographics for the whole of Europe including Russia) are active in the field of cadastre, it is planned to intensify the co-operation between the three institutions.

Official Surveying and Mapping

Part of a high class geodata infrastructure and a must for a modern state